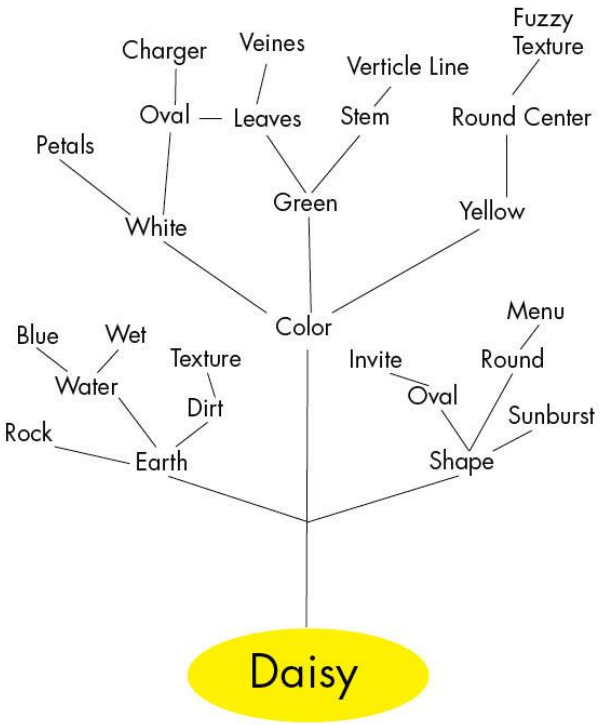
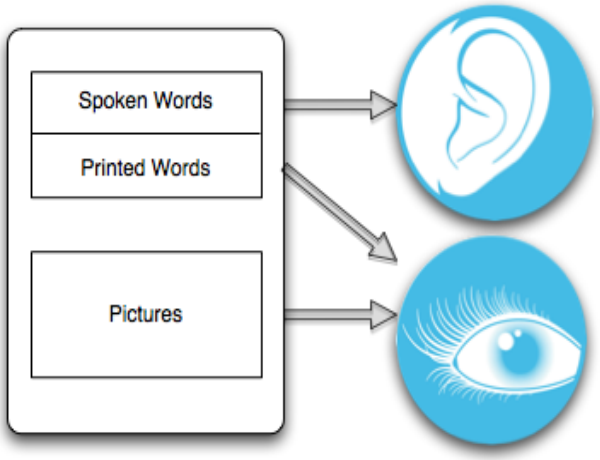
My Teaching Approach



[Schema Theory]

[Elaboration Theory]



[Cognitive Theory of Multimedia Learning]

[Operant Conditioning]

Learning Theory Summary

My teaching approach: *Concepts taught in the classroom should start at a simple/known idea and gain momentum (increase in complexity) over time. Effective use of technology to provide both audio and visual stimulation is crucial to learning success. Finally, establishment of effective classroom routines is fundamental to behaviour management, and ultimately, a non-distractive learning environment.*

The following *4 Learning Theories* best support my personal approach to teaching. Below is a brief summary of each theory with references (see references page).

Schema Theory: (Anderson)

Key Points	Why the theory is useful in mathematics	Where it is supported in educational research
- a **schema** is an abstract structure of knowledge that is used to help interpret various information - when faced with a new situation, an appropriate schema is activated and used to make inferences - *ex*: the schema for a restaurant could activate associations with objects (cutlery, plates), people (a cook, a waiter), and places (a dining room, a bar)	- methods or formative assessment such as **concept card mapping** are further validated by schema theory - schema theory is useful for sequencing lessons and units; before introducing new ideas, I would first build on what students have already seen (a partially-filled schema) and arrive at the new material. *ex*: students could complete a cell-growth activity before the exponential growth/decay chapter	- Anderson **[1]** first proposed that schema theory had applications in educational research - Ezeife, Anthony N. (University of Windsor) finds that implementing a culture-sensitive curriculum improves performance over the existing Ontario curriculum **[3]** - Korthagen and Kessels link schema theory to a proposed "realistic approach" to teaching **[4]**

Elaboration Theory: (Reigeluth)

Key Points	Why the theory is useful in mathematics	Where it is supported in educational research
- the simplest form of a concept should be taught before more detailed, elaborate ones - there is an emphasis on how materials are organized versus the actual content - students should be able to decide which concepts	- at the beginning of each unit, I would use a diagnostic test to determine which prerequisite materials need the most review - I would sequence curriculum items based on the amount of material already covered in previous years	- according to Reigeluth, "elaboration sequences help to build … scaffolding that makes subsequent, more complex understandings much easier to attain" **[9]** - English and Reigeluth confirmed that none of the elements of the theory

needs elaboration first	- theory supports idea that examples covered should gradually increase in difficulty (not the opposite)	should be deleted; they also used and validated interactive data collection for reactions to sequencing proposed by the theory **[2]**

Cognitive Theory of Multimedia Learning: (Mayer)

Key Points	Why the theory is useful in mathematics	Where it is supported in educational research
- visuals and words combined are more effective for learning than either one on its own - makes assumption that the human information-processing system contains separate audio and visual channels, that people can only focus on certain aspects of audio-visual information at one time, and that people need to be actively engaged (paying attention) to benefit	- this theory provides support for many of the excellent available online resources (Gizmos, SMART Notebook). With research-based evidence that these technologies improve learning, teachers no longer have to rely on what they "feel" works - in mathematics, drawing graphs and showing all of the steps to students (on the board) are fundamental, and the theory confirms this	- according to Mayer, "Multimedia messages designed in light of how the human mind works are more likely to lead to meaningful learning than those that are not" **[5]** - a series of experiments conducted by Mayer et al **[6]** show that students performed worse when given excess information, on-screen text and audio at the same time, and/or irrelevant video clips

Operant Conditioning: (Skinner)

Key Points	Why the theory is useful in mathematics	Where it is supported in educational research
- relies on the assumption that accepted behaviours tend to continue, and punished behaviours tend to end - proposes a process to modify behaviour using positive or negative reinforcement - unlike in classical conditioning, in this case a reward/punishment follows a voluntary action by the students	- behavioural management is important for my teaching style (students cannot learn in a disruptive environment) - this theory supports my approach of establishing standards at the beginning of the semester (i.e. by immediately giving negative responses to unwanted actions, such as shouting out answers without raising a hand first).	- Mazur, James describes a correlation between positive reinforcement and learning **[7]** - a study by McAllister et al investigated a class of 25 high school students, applied operant conditioning principles, and noticed a significant **reduction in unwanted behaviours** (in comparison to a control class of 26 students taught by the same teacher) **[8]**

References:

[1] Anderson, Richard C., Rand J. Spiro, and Wiliam E. Montague. "Schooling and the Acquisition of Knowledge." *Wiley Blackwell*. (1977): n. page. Web. 11 Jan. 2014.

[2] English, Robert E., and Charles M. Reigeluth. "Formative Research on Sequencing Instruction with the Elaboration Theory." *Educational Technology Research and Development*. 44.1 (1996): 23-42. Web. 11 Jan. 2014.

[3] Ezeife, Anthony. "The Schema-based Mathematics Study: Enriching Mathematics Teaching and Learning Using a Culture-sensitive Curriculum." *Canadian and International Education*. 40.1 (2011): 41-56. Web. 11 Jan. 2014.

[4] Korthagen, Fred A.J, and Jos P.A.M Kessels. "Linking Theory and Practise: Changing the Pedagogy of Teacher Education." *Educational Researcher*. 28.4 (1999): 4-17. Web. 11 Jan. 2014.

[5] Mayer, Richard E. "Cognitive Theory of Multimedia Learning."*Cambridge Handbook of Multimedia Learning*. (2001): 31-46. Web. 11 Jan. 2014.

[6] Mayer, Richard E., et al. "Cognitive Constraints on Multimedia Learning: When Presenting More Materials Results in Less Understanding." *Journal Of Educational Psychology*. 93.1 (2001): 187-198. Web. 11 Jan. 2014.

[7] Mazur, James E. "Learning and Behaviour." *Prentice/Hall Pearson Education*. 12.5 (2002): n. page. Web. 11 Jan. 2014.

[8] McAllister, Loring W., James G. Stachowiak, et al. "The Application of Operant Conditioning Techniques in a Secondary School Classroom." *Journal of Applied Behaviour Analysis*. 2.4 (1969): 277-285. Web. 11 Jan. 2014.

[9] Reigeluth, Charles M. "The Elaboration Theory: Guidance for Scope and Sequence Dimensions." *Lawrence Erlbaum Associates*. 2. (1999): 428-452. Print.